REMARKS

Claims 1-8 are presently pending in the application.

Claim 1 has been amended to recite that the metal case and sealing body are disposed on opposite surfaces of the sealant, which is supported at least in Figs. 1-3 and at page 12, lines 5-14, page 14, lines 11-13 and at page 15, lines 20-23. Further, claim 3 has been amended to recite that the sealing plate is metal. Support for this amendment may be found in the specification at least at page 11, lines 3-4 from the bottom. No new matter has been added by these amendments and entry is respectfully requested.

At the outset, Applicants again note that an Information Disclosure Statement was filed with the application on February 6, 2002, but an initialed copy has still not been returned. Consideration of the references cited therein and return of an initialed PTO/SB/08A are respectfully requested.

The Examiner has again rejected claims 1 and 3 under 35 U.S.C. § 102(e) as being anticipated by, or in the alternative, under § 103(a) as being obvious over U.S. Patent No. 6,146,789 of Horie et al. ("Horie"). Claims 2 and 4-8 have also been rejected under 35 U.S.C. § 103(a) as being unpatentable over Horie in view of U.S. Patent No. 4,772,291 of Shibanai et al. ("Shibanai"). Applicants respectfully traverse these rejections and the arguments in support thereof for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons which follow, and respectfully request reconsideration and withdrawal of the rejections.

Rejections Under § 102(e) or § 103(a) Based on Horie

The Examiner's basis for rejection has been explained before on the record and will not be repeated. The Examiner acknowledges Applicants' previous amendment to claim 1 to recite that the sealant is in direct contact with the metal case and sealing body and Applicants' argument that in Figure 2 of Horie, the sealant [24] is not situated between and in direct contact with the metal case [21] and the gasket [23]. The Examiner responds that the (new) phantom line drawn in the Office Action indeed shows the sealant between the metal case and the gasket.

Regarding claim 3, the Examiner notes that the claims do not require a metal sealing plate, and further argues that Horie teaches the sealant being in direct contact with the gasket or

sealing body and also in contact with the metal case. The Examiner notes that the sealant is still between the gasket and the metal case, even if the direct contact to the gasket and metal case is on one side. Applicants respectfully traverse these rejections and the arguments in support thereof as follows for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons which follow, and respectfully request reconsideration and withdrawal of the rejections.

As previously explained on the record, the present invention is directed to an electrochemical element having a structure which is capable of simultaneously confirming the applied position and the uniformity of the thickness of sealant film applied to the case, sealing plate, and gasket of the electrochemical element by visual observation or image recognition without adversely affecting the characteristics of the sealant.

Previously, sealants were colorless, but Applicants have discovered that by utilizing a sealant composed mainly of an elastomer colored by an organic pigment with a color different from the metal case and the sealing body or plate (and preferably from the gasket), it is possible to evaluate and judge the applied state of a sealant film based on the difference in saturation or color tone between the sealant and respective components. This makes reduction of the variation of the applied sealant possible, as well as minimizing unevenness of the thickness of the sealant and reducing the amount of sealant which is applied to only that which is necessary and sufficient to ensure sealing of the element. Therefore, sealant can be applied in uniform thickness to a predetermined position, such as the peripheral portion of the sealing body or plate, and can prevent leakage of the electrolyte due to variation in the applied position and film thickness of the sealant.

As recited in claims 5-8, the sealant according to the invention is colored by an organic pigment which has chemical affinity for the elastomer which forms the main component, and has a specific gravity which is substantially the same as that of the elastomer. Therefore, the pigment particles are evenly dispersed in the sealant, and no precipitation or separation of the pigment occurs (and thus no deterioration of the sealant). Since both the elastomer and the organic pigment have excellent heat resistance, and because adhesion between the sealant and other components are excellent, sealing performance can be maintained, even against excessive temperature changes and thermal stress. It is thus possible to obtain an electrochemical element with a reduced probability of electrolyte leakage.

According to the present invention, the metal case and the sealing body are disposed on

opposite surfaces of the sealant and the sealant is in direct contact with the metal case and the sealing body (claim 1). In contrast, in Fig. 2 of Horie, while the coating 24 (which the Examiner equates with the claimed sealant) is in contact with case 21 and gasket 23, elements 21 and 23 are not disposed on opposite surfaces of and in direct contact with the sealant. Rather, as the Examiner acknowledges, even on the phantom line drawn by the Examiner, the contact is on the same side of the sealant and not on opposite surfaces thereof.

In one embodiment of the present invention, the electrochemical element contains a metal sealing plate to which the sealant is directly applied (claim 3 and page 11, line 23). The sealing plate can be made of stainless steel, for example. In contrast, the Examiner notes that gasket 23, which the Examiner equates with the claimed sealing body or sealing plate, is made of a synthetic resin. There is no equivalent in Horie to the claimed (metal) sealing plate and thus Horie does not teach or suggest all of the claimed elements.

For all of these reasons; Horie does not anticipate or render obvious the present claims, and reconsideration and withdrawal of the § 102(b) and § 103(a) rejections are respectfully requested.

Rejection Under § 103(a) Based on Horie in View of Shibanai

Regarding claims 2 and 4-8, the Examiner maintains that Horie teaches that the cyanine pigment is complexed with boron, but again acknowledges that Horie does not explicitly teach a phthalocyanine-based metal complex. However, the Examiner contends that Shibanai specifically demonstrates mutual equivalence between cyanine and phthalocyanine. Absent unexpected results between cyanine and phthalocyanine, the Examiner concludes that phthalocyanine would have been an obvious substitution to the artisan for reasons such as employing a suitable organic pigment based on its distinct absorption band for a particular application requiring the band in the visible light spectrum. The Examiner notes that attorney arguments regarding advantages and unexpected results of phthalocyanine over cyanine, or alleged differences in physical properties, are not evidence and cannot take the place of evidence on the record to rebut a case of *prima facie* obviousness. Applicants respectfully traverse this rejection as follows.

As previously explained, Horie does not teach or suggest all of the claimed elements, such as a metal case and sealing body disposed on opposite surfaces and in direct contact with a sealant, or a sealant in direct contact with a gasket and metal case or metal sealing plate. Further,

even the proposed combination with Shibanai would not cure these deficiencies, since Shibanai is not directed to electrochemical elements. Further, since Shibanai teaches dyes which are used for a completely different application than Horie and not with an elastomer or organic electrolyte, Applicants maintain that one skilled in the art of Horie or the present invention would not look to Shibanai for alternative dyes to cyanines for use in a battery.

The Examiner again contends that cyanine and phthalocyanine are art-recognized equivalents, and that it would be obvious for the skilled artisan to substitute one for the other. However, as previously explained on the record, cyanine is an inferior dye with noticeable drawbacks, and phthalocyanine-based metal complexes are superior pigments with many advantages. Specifically, organic pigments composed of a phthalocyanine-based metal complex exhibit excellent organic solvent resistance, alkali resistance, and acid resistance with respect to various types of electrolytes such as organic solvents, exhibit specific gravity similar to the elastomers used in the sealants, display superior heat resistance, and do not dissolve in organic electrolytes. In contrast, cyanine dyes have poor organic solvent resistance and heat resistance, and also dissolve in organic electrolytes.

In order to investigate the organic electrolyte resistance and thermal resistance of cyanine dyes and phthalocyanine pigments, comparative experiments were performed as set forth in the Declaration of Tadayoshi Takahashi Under 37 C.F.R. 1.132 ("Takahashi Declaration"), attached hereto. The Takahashi Declaration demonstrates that cyanine dyes and phthalocyanine pigments are not equivalent with respect to organic electrolyte resistance and thermal resistance, and these differences result in the different characteristics shown in Table 2 at page 24 of the application.

As set forth in the Takahashi Declaration, comparison tests were performed using phthalocyanine copper (phthalocyanine blue), a representative organic pigment comprising a phthalocyanine-based metal complex, and cyanin (quinoline blue), a representative cyanine dye.

To evaluate organic electrolyte resistance, two types of organic electrolytes for lithium secondary batteries were prepared as described in ¶ 11 of the Takahashi Declaration. The cyanine dye and phthalocyanine pigment were each added separately to a sample of each electrolyte solution at the same concentration and their dissolution was studied (Takahashi Declaration, ¶ 12). It was observed that while the whole quantity (0.1 g) of cyanin (the cyanine dye) immediately dissolved in both electrolyte samples, the phthalocyanine blue (phthalocyanine pigment) did not dissolve at all in either electrolyte, even after 1,000 hours (Takahashi

Declaration, ¶ 14).

To evaluate thermal resistance, samples of the cyanine dye and the phthalocyanine pigment were placed in a furnace of circulating 250° C hot air for 15 minutes (Takahashi Declaration, ¶ 13). It was observed that the weight of phthalocyanine blue decreased by only about 1 weight %, whereas the weight of the cyanin decreased by about 70% (Takahashi Declaration, ¶ 15). Based on these results, it is clear that cyanine dyes and phthalocyanine pigments exhibit different physical behaviors with respect to organic electrolyte resistance and thermal resistance, and that one could not simply substitute a cyanine dye for a phthalocyanine pigment with the expectation of similar results, particularly for use in a lithium secondary battery. Further, the favorable properties of the phthalocyanine pigment, resistance to dissolution in organic electrolytes and thermal resistance, make such pigments ideal for use in the claimed invention, and result in the superior leakage resistance shown in Table 2 at page 24 of the application, a property which is not displayed by the dyes.

Applicants have thus demonstrated with experimental evidence why, even if one were to select cyanine from the long list of possible dyes of Horie (col. 4, lines 4-8), there would have been no motivation to replace it with a phthalocyanine-based metal complex. Further, the properties exhibited by the present invention would not have been expected based on such a substitution. Accordingly, even if a case of *prima facie* obviousness had been established based on the proposed combination of Horie and Shibanai, it would have been overcome by the unexpected results of Applicants' invention and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

In view of the preceding Amendments, Remarks and Takahashi Declaration, Applicants submit that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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